

# Inside Story HIGHLIGHTS

From the Pacific Radiology Referrer Newsletter



Pacific Radiology



## Intravenous Contrast in CT Imaging

**Intravenous contrast is often given as part of a CT examination. The decision to give IV contrast depends on the clinical indication for the study, findings of the study and patient risk factors.**

Like any pharmaceutical agent there are a number of contraindications associated with the iodine based contrast agent we use primarily in CT (but also in angiography and intra-articular injections). Volumes administered for CT range from 50-120ml of IV contrast. All patients are given information to allow them to give informed consent for contrast administration. All patients who potentially may receive IV contrast for CT are given a questionnaire to identify any risk factors.

There is an estimated mortality rate associated with the use of non-ionic low osmolality contrast media of 1 in 170,000. Most adverse effects require no medical treatment. However, caution should be exercised with patients who are acutely unwell, hypovolaemic or in congestive heart failure.

### **PATIENT RISK FACTORS THAT WE NEED TO KNOW ABOUT:**

#### **1. Asthma**

If the patient is well controlled and does not have an acute exacerbation at the time of the examination the risk of inducing significant bronchospasm is very low. If the patient is poorly controlled at the time of examination then use of IV contrast should be deferred or another modality used that does not require iodinated contrast.

#### **2. Multiple allergies or a documented severe allergy**

Use of IV contrast should be avoided if the patient has had a previous documented severe allergic reaction to iodinated intravenous contrast agents. There is no evidence of cross reactivity between shellfish allergy or topical iodine reaction and reactions to iodinated IV contrast.

#### **3. Renal Impairment**

Contrast Induced Nephropathy (CIN) is the sudden rapid deterioration of renal function resulting from parenteral contrast media administration and with no alternative clinical explanation. CIN is defined as a change in creatinine of at least 25% from baseline. CIN is not common in patients with normal pre-existing renal function but is more frequent in patients with renal impairment especially when their renal insufficiency is attributable to diabetic nephropathy. The rate of CIN in patients with renal insufficiency is low at approximately 5% (and is often subclinical).

In order to minimize the risk of CIN a recent serum creatinine (within the last three months) should be available for all patients who:

- > have a history of renal disease, renal surgery or diabetes;
- > are over 70 years of age;

- > are on Metformin to treat their diabetes;
- > have a paraproteinaemia syndrome such as myeloma;
- > are on treatment with nephrotoxic drugs such as NSAIDs and Aminoglycosides;
- > have collagen vascular disease.



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IV contrast can be used safely in patients with end stage renal failure on permanent dialysis. Patients with very poor renal function not on dialysis or on intermittent dialysis are at serious risk for progressive renal impairment. In these patients it is prudent to avoid IV contrast or use other modalities that do not use any contrast.

If serum creatinine is abnormal or the patient has other clinical features that would make renal impairment likely (such as very old/frail, recent haemorrhage, systemic sepsis, congestive failure, shock) an eGFR is calculated.

Patients considered potentially at risk of CIN have an eGFR below 60ml/min. Hydration therapy is recommended if the eGFR is <60ml/min. This can be given orally if the eGFR is between 30-60ml/min. If the eGFR is <30ml/min inpatient admission and IV hydration should be considered.

Hydration is the intervention that has most consistently been demonstrated effective in reducing the risk of CIN. Its advantages are low cost and risk to the patient in all except very fluid intolerant patients. Increased intravascular volume from hydration induces diuresis causing dilution of the contrast media in the renal tubule and decreased time in contact time with the kidney. Hydration should be performed prior to and after any IV contrast administration. The optimum timing and duration of oral or IV hydration has not been determined in the literature but commencing earlier prior to contrast administration and continuing longer after is better.

At Pacific Radiology we are using water as our oral contrast agent for CT abdomen (total volume 1000ml) which will give good pre-procedure hydration. An example of an IV regimen is 2ml/kg body weight for 2 hours prior to contrast administration and 1ml/kg for 6 hours after the examination.

#### **4. Hyperthyroidism**

Iodinated IV contrast is to be avoided in patients with hyperthyroidism.

#### **5. Metformin**

If there is acute renal failure after IV contrast administration this can lead to increased serum levels of Metformin and subsequent lactic acidosis. The risk of this is extremely low.

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Patients with pre-existing abnormal renal function should have Metformin stopped on the day of the exam and restarted after creatinine assessment 48 hours later. If renal function is normal and normal volumes of contrast are given there is no need to stop Metformin. If large volumes are given or there are other factors which may affect renal function acutely (CHF, shock, systemic sepsis) then Metformin should be stopped and restarted after repeat creatinine 48 hours later.

#### **SUMMARY**

Intravenous contrast is administered frequently for CT examinations. It has an extremely good safety profile. Referrers can help identify which patients require IV contrast by outlining clearly the clinical indications for the examination and minimize the risk of allergic reactions and contrast induced nephropathy by assessing patients serum creatinine, risk factors and encouraging oral hydration.

Our booking staff have guidelines for assessing serum creatinine and Metformin use. If there are any questions please feel free to discuss them with me or any of the other radiologists.

~ **Rodney Wu**

#### **References:**

*Contrast-Induced Nephropathy and Nephrogenic Systemic Fibrosis: Radiologic Clinics of North America Volume 47, Number 5 September 2009*

*Pacific Radiology Limited IV Contrast Policy December 2007*

